

E. C. BOCK

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-9-4
Relating to Exemptions under Section 27156
of the Vehicle Code

BALL-MATIC CORPORATION
"BALL-MATIC AIR INJECTOR"

Pursuant to the authority vested in the Air Resources Board by Section 27156 of the Vehicle Code; and

Pursuant to the authority vested in the undersigned by Section 39515 of the Health and Safety Code and Executive Order G-30A;

IT IS ORDERED AND RESOLVED: That the installation of the "Ball-Matic Air Injector" manufactured by Ball-Matic Corporation of 1429 Palo Loma, Orange, California 92668 has been found to not reduce the effectiveness of required motor vehicle pollution control devices and, therefore, is exempt from the prohibitions of Section 27156 of the Vehicle Code for 1977 and older vehicles except for those vehicles equipped with:

- (1) Chrysler's Electronic Lean Burn System
- (2) Volvo's Three-Way Catalyst
- (3) Bosch Jetronic Fuel Injection Systems

The device consists of an air modulating valve with a filter and is inserted between the PCV valve and the intake manifold. This valve permits a small amount of additional air to enter the PCV line. This device can be identified by the name "Ball-Matic Air Injector" permanently stamped at the bottom of the device housing.

This Executive Order is valid provided that installation instructions for this device will not recommend tuning the vehicle to specifications different from those listed by the vehicle manufacturer.

Changes made to the design or operating conditions of the device, as exempted by the Air Resources Board, that adversely affect the performance of a vehicle's pollution control system shall invalidate this Executive Order.

Marketing of this device using an identification other than that shown in this Executive Order or marketing of this device for an application other than those listed in this Executive Order shall be prohibited unless prior approval is obtained from the Air Resources Board.

This Executive Order does not constitute any opinion as to the effect that the use of this device may have on any warranty either expressed or implied by the vehicle manufacturer.

THIS EXECUTIVE ORDER DOES NOT CONSTITUTE A CERTIFICATION, ACCREDITATION, APPROVAL, OR ANY OTHER TYPE OF ENDORSEMENT BY THE AIR RESOURCES BOARD OF ANY CLAIMS OF THE APPLICANT CONCERNING ANTI-POLLUTION BENEFITS OR ANY ALLEGED BENEFITS OF THE "BALL-MATIC" DEVICE.

No claim of any kind, such as "Approved by Air Resources Board" may be made with respect to the action taken herein in any advertising or other oral or written communication.

Section 17500 of the Business and Professions Code makes untrue or misleading advertising unlawful, and Section 17534 makes violation punishable as a misdemeanor.

Section 43644 of the Health and Safety Code provides as follows:

"43644. (a) No person shall install, sell, offer for sale, or advertise, or, except in an application to the state board for certification of a device, represent, any device as a motor vehicle pollution control device for use on any used motor vehicle unless that device has been certified by the state board. No person shall sell, offer for sale, advertise, or represent any motor vehicle pollution control device as a certified device which, in fact, is not a certified device. Any violation of this subdivision is a misdemeanor."

Any apparent violation of the conditions of this Executive Order will be submitted to the Attorney General of California for such action as he deems advisable.

Executed at Sacramento, California, this 29th day of November, 1976.

Original Signed By
Thomas C. Austin
Deputy Executive Officer-Technical

State of California

AIR RESOURCES BOARD

November 5, 1976

Evaluation of the Ball-Matic Corporation
"Ball-Matic Air Injector" Device for
Compliance with the Requirements of
Section 27156 of the California Vehicle Code

I. Introduction

The Ball-Matic Corporation of 1429 Palo Loma, Orange, California 92668 has submitted an application requesting an extension to a previously granted exemption from the prohibitions of Section 27156 of the California Vehicle Code for the "Ball-Matic Air Injector". This application is for 1977 and older model-year vehicle usage.

The Air Resources Board staff had previously evaluated this device (Staff Report dated November 18, 1975), and found that the device had no adverse effects on the vehicle emission control system. Executive Order D-9-3 was issued on November 4, 1975 to Ball-Matic Corporation for its "Ball-Matic Air Injector" for 1976 and older model-year vehicles. The applicant has requested that this exemption be extended to include the 1977 vehicles (Exhibit A).

November 5, 1976

II. System Description and Function

The "Ball-Matic" device consists of a filter, plastic ball, spring, and a metal housing with ports used to insert the device between the PCV valve and carburetor. Exhibit B is a copy of the installation instructions. The name "Ball-Matic Air Injector" is printed on a durable label pasted to the bottom of the device housing.

The device has a modulating poppet which meters the quantity of air bleed into the engine. Engine manifold vacuum determines the degree of poppet opening. Maximum air flow occurs at low vacuum (high speed and wide open throttle) and minimum flow occurs at high vacuum (idle and deceleration). When the engine is not operating, the poppet is in the open position.

III. System Evaluation

A. Effects on the Vehicle Exhaust Emission Control Systems

The Applicant stated that there was no change in the "Ball-Matic" device or its application. The ARB ran a bench flow test on the new device submitted (Fig. 1) and confirmed that the device flow characteristics were identical to the previously evaluated device.

Evaluation of the Ball-Matic Corporation "Ball-Matic Air Injector" Device for Compliance with the Requirements of Section 27156 of the California Vehicle Code

November 5, 1976

The ARB Laboratory had previously conducted a bench flow test on the device and back-to-back CVS-II emission tests on a fleet of 1975 vehicles. The vehicles chosen all had small engines since these vehicles are most susceptible to the "air bleed" type of add-on device. The results of the above tests indicated the amount of air bleed allowed by the device was insignificant and consequently no adverse effect on exhaust emissions was detected in the above emission tests.

The 1977 vehicle emission control systems are basically the same as the 1975 systems except for some vehicles which are equipped with mechanisms that make the engine extremely sensitive to air fuel mixture variations. These new systems include the Chrysler's Electronic Lean Burn System (ELB), Volvo's Three-Way Catalyst, and Bosch Jetronic Fuel Injection Systems. It is our judgement that the installation of the "Ball-Matic" device on the vehicles equipped with the above new exhaust emission control systems could adversely affect the engine performance and operation.

November 5, 1976

B. Manufacturer's Claims

Exhibit C is a copy of the manufacturer's advertised claims on the device. The claims include "Gas saving up to 20%", "New found power, effortless cruising", "A cleaner more efficiently running engine with less carbon build-up".

The staff believes the installation of the device will not provide the benefits claimed. On a typical small size engine the amount of air bleed allowed by the device is less than 1% of the air flow at all operating conditions. These air bleed rates will not significantly effect the air fuel ratio or manifold vacuum. In addition previous emission tests by the ARB Laboratory did not show significant improvement in the fuel economy of the vehicles tested when the "Ball-Matic" device was installed.

The applicant could not substantiate the above claims except for testimonial letters which were not supported with engineering data. The applicant was notified by letter dated November 4, 1976 of ARB findings regarding the advertised benefits of the device. This letter also requested him to delete the aforementioned claims from the advertisement of the "Ball-Matic" device.

Evaluation of the Ball-Matic Corporation "Ball-Matic Air Injector" Device for Compliance with the Requirements of Section 27156 of the California Vehicle Code

November 5, 1976

IV. Conclusion and Recommendation

Evaluation of the "Ball-Matic" device showed that the installation of the device on most 1977 vehicles will not adversely affect the exhaust emission control system.

Therefore the staff recommends that the Ball-Matic Corporation be granted an exemption from the prohibition of MVC Section 27156 for 1977 and older vehicles except for those vehicles equipped with:

- (1) Chrysler's Electronic Lean Burn System
- (2) Volvo's Three-Way Catalyst
- (3) Bosch Jetronic Fuel Injection Systems

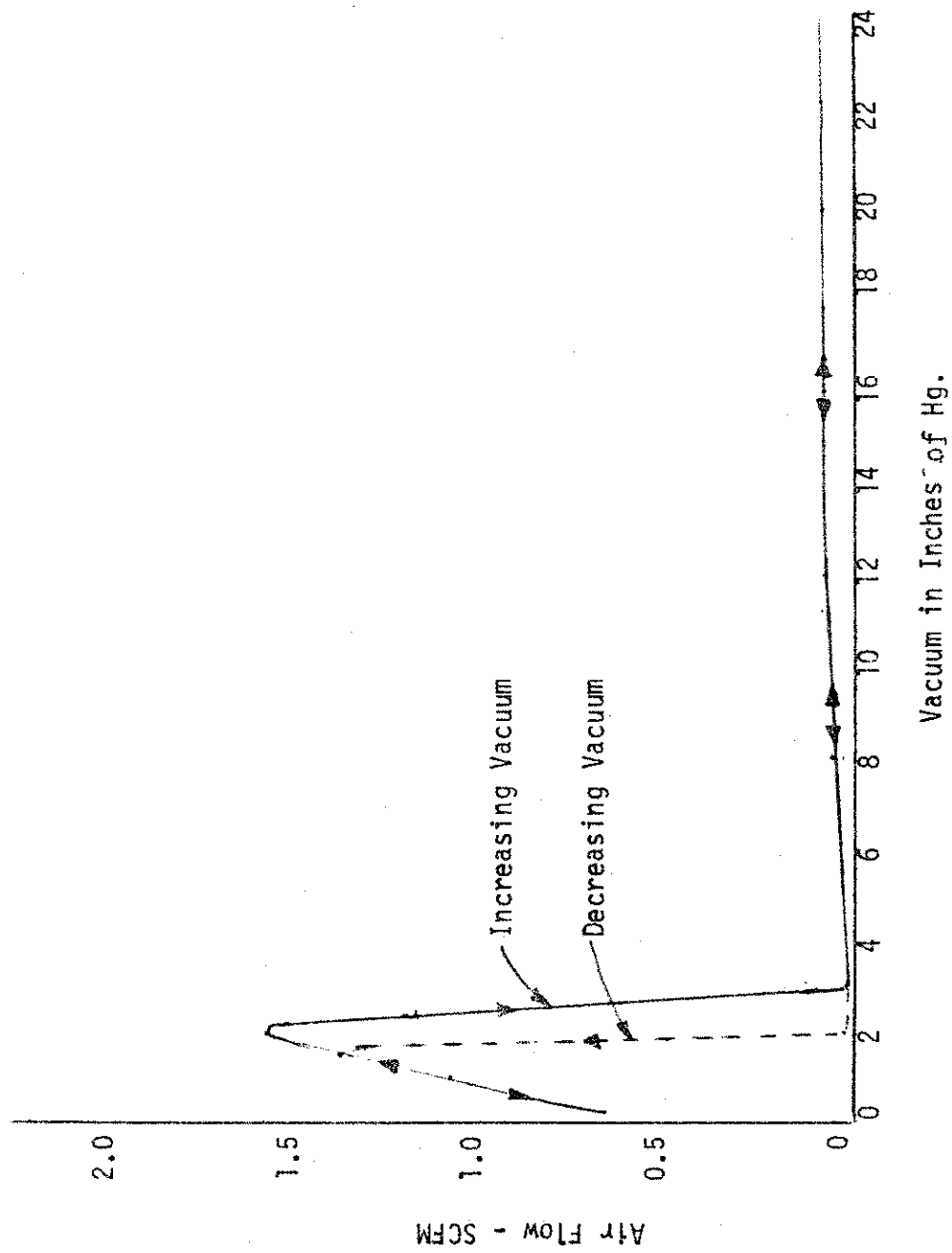
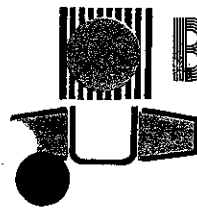


Fig. 1 Bench Flow Curve of Balmatic Device



BALL-MATIC
CORPORATION

707 NORTH MAIN STREET

ORANGE, CALIFORNIA 92668

1429 PALO LOMA

(714) 997-4750
997-4751
633-8723

AIR RESOURCES BOARD
9528 TELESTAR AVE.
EL MONTE, CALIF. 91731
ATTN: G. HASS

SEPT. 7, 1976

DEAR SIR:

PLEASE REVIEW OUR POSSIBILITIES FOR AN EXTENSION
OF YOUR EXECUTIVE ORDER D-9-3 (1976) and older vehicles
OUR AIR BLEED VALVE (BALL-MATIC) IS STILL THE SAME IN
EVERY RESPECT WITH NO CHANGES. WE ARE ABSTAINING FROM
INSTALLATION OF THE VALVE ON 1977 VEHICLES UNTIL WE
HEAR FROM YOU .

THANK YOU FOR YOUR COOPERATION IN THE PAST.

YOURS VERY TRULY

LONNIE W. SMITH

PRESIDENT

CONSERVE FUEL

• HIGH PERFORMANCE FUEL SAVER

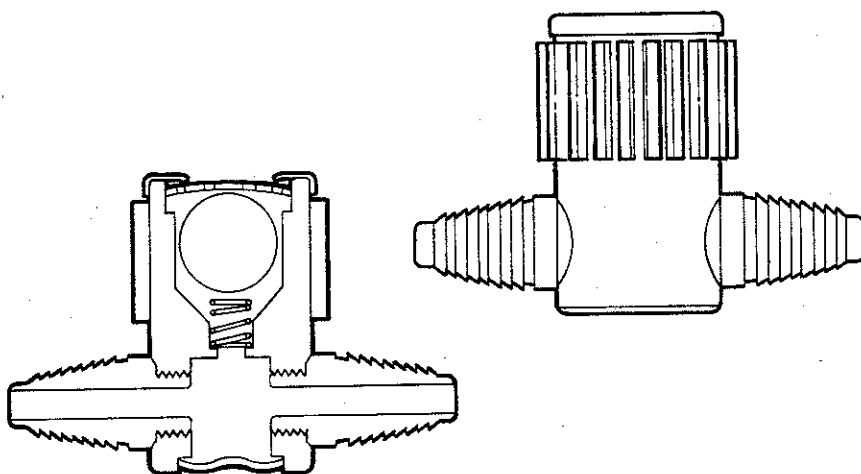
Ball-Matic Air Injector

GAS SAVINGS UP TO 20%

We have in our files hundreds of letters from satisfied customers stating that the Ball-Matic Valve has increased their mileage up to 20% and in many cases even more. These letters are available to anyone who cares to see them. Many letters from our customers claim better performance, less maintenance, as well as better mileage.

Why is the Ball-Matic Needed on Your Car? Carburetors are notoriously inefficient. Most carburetors are set at a 15:1 ratio of air to fuel. This is efficient up to about 35 M.P.H. At higher speeds, the combustion chamber demands more fuel. But the amount of air entering the chamber is fixed causing too rich a mixture. The mixture does not burn completely, resulting in gasoline waste and loss of power. The Ball-Matic was designed to improve the mixture of air and fuel at all speeds. Results: Gas Savings And More Power For You!

Does it Work on All American Cars? Yes, and anyone can install it on most cars in a few minutes. It works on your **camper, truck or boat engine!** For Foreign cars see instruction sheets.

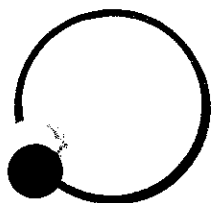


Legal to install on all cars in the State of California 1976 and older.

How do you install the Ball-Matic on Your Car? Complete instructions come with the unit for all major automobile manufacturers, excluding Volkswagens.

What Have You Got to Gain? Amazing Gas Savings, Up to 20%! New found power, effortless cruising, even up steep hills or when hauling trailers, campers, etc. A cleaner, more efficiently running engine with less carbon build-up.

Guarantee. The Ball-Matic is guaranteed to be free from defects in workmanship and materials. Your authorized dealer will replace or refund full purchase price on any unit that is inoperative under normal use for a period of up to one year from date of purchase.


BALL-MATIC

CORPORATION

Pat. No. 3809035
(Issued 5/7/74)

1429 PALO LOMA PLACE, ORANGE, CALIFORNIA 92669

TELEPHONE: (714) 633-8723

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-9-5
Relating to Exemptions under Section 27156
of the Vehicle Code

BALL-MATIC CORPORATION
"BALL-MATIC AIR INJECTOR"

Pursuant to the authority vested in the Air Resources Board by Section 27156 of the Vehicle Code; and

Pursuant to the authority vested in the undersigned by Section 39515 of the Health and Safety Code and Executive Order G-30A;

IT IS ORDERED AND RESOLVED: That the installation of the "Ball-Matic Air Injector" manufactured by Ball-Matic Corporation of 1429 Palo Loma, Orange, CA 92669, has been found to not reduce the effectiveness of required motor vehicle pollution control devices and, therefore, is exempt from the prohibitions of Section 27156 of the Vehicle Code for 1978 and older vehicles except for those vehicles equipped with:

- (1) Chrysler's Electronic Lean Burn System
- (2) Volvo's Three-Way Catalyst
- (3) K and L Bosch Jetronic Fuel Injection Systems
- (4) Variable Venturi Carburetor Systems

The device consists of an air modulating valve with a filter and is inserted between the PCV valve and the intake manifold. This valve permits a small amount of additional air to enter the PCV line. This device can be identified by the name "Ball-Matic Air Injector" permanently stamped at the bottom of the device housing.

This Executive Order is valid provided that installation instructions for this device will not recommend tuning the vehicle to specifications different from those listed by the vehicle manufacturer.

Changes made to the design or operating conditions of the device, as exempted by the Air Resources Board, that adversely affect the performance of a vehicle's pollution control system shall invalidate this Executive Order.

Marketing of this device using an identification other than that shown in this Executive Order or marketing of this device for an application other than those listed in this Executive Order shall be prohibited unless prior approval is obtained from the Air Resources Board.

This Executive Order does not constitute any opinion as to the effect that the use of this device may have on any warranty either expressed or implied by the vehicle manufacturer.

THIS EXECUTIVE ORDER DOES NOT CONSTITUTE A CERTIFICATION, ACCREDITATION, APPROVAL, OR ANY OTHER TYPE OF ENDORSEMENT BY THE AIR RESOURCES BOARD OF ANY CLAIMS OF THE APPLICANT CONCERNING ANTI-POLLUTION BENEFITS OR ANY ALLEGED BENEFITS OF THE "BALL-MATIC AIR INJECTOR" DEVICE.


Section 17500 of the Business and Professions Code makes untrue or misleading advertising unlawful, and Section 17534 makes violation punishable as a misdemeanor.

Section 43644 of the Health and Safety Code provides as follows:

"43644. (a) No person shall install, sell, offer for sale, or advertise, or, except in an application to the state board for certification of a device, represent, any device as a motor vehicle pollution control device for use on any used motor vehicle unless that device has been certified by the state board. No person shall sell, offer for sale, advertise, or represent any motor vehicle pollution control device as a certified device which, in fact, is not a certified device. Any violation of this subdivision is a misdemeanor."

Any apparent violation of the conditions of this Executive Order will be submitted to the Attorney General of California for such action as he deems advisable.

Executed at Sacramento, California, this 20th October day of ~~September~~, 1977.


Thomas C. Austin
Deputy Executive Officer

State of California
AIR RESOURCES BOARD

September 19, 1977

Evaluation of the Ball-Matic Corporation
"Ball-Matic Air Injector" Device for Compliance
with the Requirements of Section 27156 of the
California Vehicle Code

I. Introduction

The Ball-Matic Corporation of 1429 Palo Loma, Orange, California 92669 has submitted an application requesting an extension of a previously granted exemption from the prohibitions of Section 27156 of the California Vehicle Code for the "Ball-Matic Air Injector" for the 1978 and older model year vehicles. Section 27156 of the Vehicle Code prohibits the advertisement, sale and installation of any device or mechanism which reduces the effectiveness of the motor vehicle emission control system.

The Air Resources Board (ARB) staff had evaluated this device previously (Staff Report dated November 5, 1976) and found the device had no adverse effects on the emission control system. Executive Order D-9-4 was issued on November 29, 1976 to Ball-Matic Corporation for its "Ball-Matic Air Injector" for 1977 and older model-year vehicles. The applicant has requested that this exemption be extended to include the 1978 model year vehicles. (Exhibit A).

II. System Description and Function

The "Ball-Matic" device consists of a filter, plastic ball, spring, and a metal housing with parts used to insert the device between the PCV valve and carburetor. The name "Ball-Matic Air Injector" is printed on a durable label pasted to the bottom of the device housing. According to the applicant, this device is designed to improve fuel economy and engine performance.

The device has a modulating poppet which meters the quantity of air bleed into the engine. Engine manifold vacuum determines the degree of poppet opening. Maximum air flow (1.5 SCFM) occurs at low vacuum (~3 in. Hg, high speed and wide open throttle) and minimum flow (0.1 SCFM) occurs at high vacuum (~18 in. Hg, idle and deceleration). When the engine is not operating, the poppet is in the open position.

III. System Evaluation

The applicant states that there is no change in the unit or its application. CVS-75 emission tests made by the ARB laboratory on a 1975 Pinto, a Vega and a Datsun did not show a significant increase in emissions. (Reference ARB Report titled Evaluation of the Ball-Matic Air Injector Device for Compliance with the Requirements of Section 27156 of the California Vehicle Code dated September 10, 1975) the vehicles chosen all had small engines since these are most susceptible to the "air bleed" type of add-on devices. The emission results of these tests are as follows:

Vehicle	Emissions (grams/mile)						Fuel Economy miles/gal	
	Baseline			With Device			Baseline	With Device
	HC	CO	NOx	HC	CO	NOx		
1975 Ford Pinto	(1) 0.3	2.6	2.0	0.3	2.6	2.1	18.0	17.8
	(2) 0.2	2.4	1.1	0.2	3.0	1.1	13.6	14.7
	(2) 0.2	2.9	1.0	0.3	3.7	1.0	13.8	13.8
1975 Datsun	0.3	3.0	2.0	0.3	1.5	1.7	20.1	22.2
1975 Vega	0.4	6.9	1.6	0.5	6.2	1.6	17.2	17.0
Overall Averages	0.3	4.0	1.5	0.3	3.4	1.5	16.5	17.1

(1) License # 194LVF

(2) License # 195LVF (2 tests)

These results are within experimental variations although some anomalies were apparent. The average of all available data indicated there was no significant effect on emissions with the device.

Bench flow tests on the valve showed a maximum flow rate of 0.1 cubic feet a minute for 18 inches mercury vacuum and 1.5 cubic feet a minute for 3 inches mercury vacuum. The ARB staff felt that there was no need to run bench flow or emission tests on the device since the device flow characteristics were found to be identical when it was tested a second time. (Reference ARB Report titled "Evaluation of the Ball-Matic Corporation". "Ball-Matic Air Injector" Device for Compliance with the Requirements of Section 27156 of the California Vehicle Code dated November 5, 1976).

The amount of air bleed allowed by the device was insignificant and consequently no adverse effect on exhaust emissions was detected in the above emission tests.

The 1978 vehicle emission control systems are basically the same as the 1977 systems except for some vehicles which are equipped with mechanisms that make the engine extremely sensitive to air fuel mixture variations. These new systems include the Chrysler's Electronic Lean Burn System (ELB), Volvo's three-way Catalyst, and Bosch Jetronic Fuel Injection System and the Variable Venturi Carburetor System. It is the staff's judgment that the installation of the "Ball-Matic" device on the vehicles equipped with the above new exhaust emission control systems could adversely affect the engine performance and operation.

IV. Manufacturer's Claims

The staff believes the installation of the device will not provide the fuel economy claims. On a typical small size engine the amount of air bleed allowed by the device is less than 1% of the air flow at all operating conditions. These air bleed rates will not significantly affect the air-fuel ratio or manifold vacuum. In addition previous emission tests by the ARB Laboratory did not show significant improvement in the fuel economy of the vehicles tested when the "Ball-Matic" device was installed. (Reference ARB Report titled "Evaluation of the Ball-Matic Corporation "Ball-Matic Air Injector" device for Compliance with the Requirements of Section 27156 of the California Vehicle Code dated November 5, 1976.)

V. Conclusions and Recommendations

The staff is of the opinion that the installation of this device would not affect the performance of the emission control system.

Therefore the staff recommends that the "Ball-Matic" Corporation be granted an exemption from the prohibitions of MVC Section 27156 for 1978 and older vehicles except for those vehicles equipped with:

- 1) Chrysler's Electronic Lean Burn (ELB) System
- 2) Volvo's three-way catalyst
- 3) Bosch Jetronic Fuel Injection Systems
- 4) Variable Venturi Carburetor Systems

The staff therefore recommends adoption of Executive Order D-9-5.

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-9-6
Relating to Exemptions under Section 27156
of the Vehicle Code

BALL-MATIC CORPORATION
"BALL-MATIC AIR INJECTOR"

Pursuant to the authority vested in the Air Resources Board by Section 27156 of the Vehicle Code; and

Pursuant to the authority vested in the undersigned by Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-45-5;

IT IS ORDERED AND RESOLVED: That the installation of the "Ball-Matic Air Injector" manufactured by Ball-Matic Corporation of 1429 Palo Loma, Orange, California 92669, has been found to not reduce the effectiveness of required motor vehicle pollution control devices and, therefore, is exempt from the prohibitions of Section 27156 of the Vehicle Code for 1979 and older vehicles except for those vehicles equipped with:

1. Three way catalyst with feed back system.
2. Fuel injection systems.
3. Variable venturi carburetor systems.

The device consists of an air modulating valve with a filter and is inserted into the PCV line. This valve permits a small amount of additional air to enter the PCV line. This device can be identified by the name "Ball-Matic Air Injector" permanently stamped at the bottom of the device housing.

This Executive Order is valid provided that installation instructions for this device will not recommend tuning the vehicle to specifications different from those listed by the vehicle manufacturer.

Changes made to the design or operating conditions of the device, as exempted by the Air Resources Board, that adversely affect the performance of a vehicle's pollution control system shall invalidate this Executive Order.

Marketing of this device using an identification other than that shown in this Executive Order or marketing of this device for an application other than those listed in this Executive Order shall be prohibited unless prior approval is obtained from the Air Resources Board.

This Executive Order does not constitute any opinion as to the effect that the use of this device may have on any warranty either expressed or implied by the vehicle manufacturer.

THIS EXECUTIVE ORDER DOES NOT CONSTITUTE A CERTIFICATION, ACCREDITATION, APPROVAL, OR ANY OTHER TYPE OF ENDORSEMENT BY THE AIR RESOURCES BOARD OF ANY CLAIMS OF THE APPLICANT CONCERNING ANTI-POLLUTION BENEFITS OR ANY ALLEGED BENEFITS OF THE "Ball-Matic Air Injector" device.

No claim of any kind, such as "Approved by Air Resources Board" may be made with respect to the action taken herein in any advertising or other oral or written communication.

Section 17500 of the Business and Professions Code makes untrue or misleading advertising unlawful, and Section 17534 makes violation punishable as a misdemeanor.

Section 43644 of the Health and Safety Code provides as follows:

"43644. (a) No person shall install, sell, offer for sale, or advertise, or, except in an application to the state board for certification of a device, represent, any device as a motor vehicle pollution control device for use on any used motor vehicle unless that device has been certified by the state board. No person shall sell, offer for sale, advertise, or represent any motor vehicle pollution control device as a certified device which, in fact, is not a certified device. Any violation of this subdivision is a misdemeanor."

Any apparent violation of the conditions of this Executive Order will be submitted to the Attorney General of California for such action as he deems advisable.

Executive Order D-9-5 dated October 20, 1978, is superseded and of no further force and effect.

Executed at El Monte, California, this 13 day of November, 1978.


G. C. Hass, Chief
Vehicle Emissions Control Division

State of California
AIR RESOURCES BOARD

November 1, 1978

Evaluation of the Ball-Matic Corporation
"Ball-Matic Air Injector" Device for Compliance
with the Requirements of Section 27156 of the
California Vehicle Code

1. Introduction

The Ball-Matic Corporation of 1429 Palo Loma, Orange, California 92669 has submitted an application request²² for an extension of a previously granted exemption from the prohibitions of Section 27156 of the California Vehicle Code for the "Ball-Matic Air Injector" for the 1978 and older model year vehicles. Section 27156 of the Vehicle Code prohibits the advertisement, sale and installation of any device or mechanism which reduces the effectiveness of the motor vehicle emission control system.

The Air Resources Board (ARB) staff had evaluated this device previously (Staff Report dated September 19, 1977) and found the device had no adverse effects on the emission control system. Executive Order D-9-5 was issued on October 20, 1977 to Ball-Matic Corporation for its "Ball-Matic Air Injector" for 1978 and older model-year vehicles with certain exceptions. The applicant has requested that this exemption be extended to include the 1979 model year vehicles. (Exhibit A).

THIS EXECUTIVE ORDER DOES NOT CONSTITUTE A CERTIFICATION, ACCREDITATION, APPROVAL, OR ANY OTHER TYPE OF ENDORSEMENT BY THE AIR RESOURCES BOARD OF ANY CLAIMS OF THE APPLICANT CONCERNING ANTI-POLLUTION BENEFITS OR ANY ALLEGED BENEFITS OF THE "Ball-Matic Air Injector" device.

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Any apparent violation of the conditions of this Executive Order will be submitted to the Attorney General of California for such action as he deems advisable.

Executive Order D-9-5 dated October 20, 1978, is superseded and of no further force and effect.

Executed at El Monte, California, this 13 day of November, 1978.



G. C. Hass, Chief
Vehicle Emissions Control Division

State of California
AIR RESOURCES BOARD

November 1, 1978

Evaluation of the Ball-Matic Corporation
"Ball-Matic Air Injector" Device for Compliance
with the Requirements of Section 27156 of the
California Vehicle Code

1. Introduction

The Ball-Matic Corporation of 1429 Palo Loma, Orange, California 92669 has submitted an application requesting an extension of a previously granted exemption from the prohibitions of Section 27156 of the California Vehicle Code for the "Ball-Matic Air Injector" for the 1978 and older model year vehicles. Section 27156 of the Vehicle Code prohibits the advertisement, sale and installation of any device or mechanism which reduces the effectiveness of the motor vehicle emission control system.

The Air Resources Board (ARB) staff had evaluated this device previously (Staff Report dated September 19, 1977) and found the device had no adverse effects on the emission control system. Executive Order D-9-5 was issued on October 20, 1977 to Ball-Matic Corporation for its "Ball-Matic Air Injector" for 1978 and older model-year vehicles with certain exceptions. The applicant has requested that this exemption be extended to include the 1979 model year vehicles.

II. System Description and Function

The "Ball-Matic" device consists of a filter, plastic ball, spring, and a metal housing with parts used to insert the device into the PCV line. The name "Ball-Matic Air Injector" is printed on a durable label pasted to the bottom of the device housing. According to the applicant, this device is designed to improve fuel economy and engine performance.

The device has a modulating poppet which meters a quantity of air bleed into the engine. Engine manifold vacuum determines the degree of poppet opening. A valve purchased by the Air Resources Board in the open market showed a maximum air flow of (1.0 SCFM) at 7 in. Hg. vacuum and no flow above 7 in. Hg. vacuum (see flow curve). As the vacuum decreases below 7 in. Hg. vacuum the air flow decreases very rapidly.

III. System Evaluation

The applicant states that there is no change in the unit or its application. CVS-75 emission tests made by the ARB laboratory on a 1975 Pinto, a Vega and a Datsun did not show a significant increase in emissions. (Reference ARB Report titled Evaluation of the Ball-Matic Air Injector Device for Compliance with the Requirements of Section 27156 of the California Vehicle Code dated September 19, 1975) The vehicles chosen all had small engines since these are most susceptible to the "air bleed" type of add-on devices. The emission results of these tests were as follows:

Vehicle	Emissions (grams/mile)						Fuel Economy miles/ga		
		Baseline			With Device			Baseline	With Device
		HC	CO	NOx	HC	CO	NOx		
1975 Ford Pinto	(1)	0.3	2.6	2.0	0.3	2.6	2.1	18.0	17.8
	(2)	0.2	2.4	1.1	0.2	3.0	1.1	13.6	14.7
	(2)	0.2	2.9	1.0	0.3	3.7	1.0	13.8	13.8
1975 Datsun		0.3	3.0	2.0	0.3	1.5	1.7	20.1	22.2
1975 Vega		<u>0.4</u>	<u>6.9</u>	<u>1.2</u>	<u>0.5</u>	<u>6.2</u>	<u>1.6</u>	<u>17.2</u>	<u>17.0</u>
Overall Averages		0.3	4.0	1.5	0.3	3.4	1.5	16.5	17.1
(1) License # 194LVF									
(2) License # 195LVF (2 tests)									

These results are within experimental variations although some anomalies were apparent. The average of all available data indicated there was no significant effect on emissions with the device.

In order to update the previous report, the Air Resources Board purchased a valve in the open market. Bench flow tests on this valve showed a maximum flow rate of 1.0 cubic feet a minute for 7 inches mercury vacuum and no flow above 7 inches mercury vacuum. The ARB staff felt that there was no need to run emission tests on the device since the device flow characteristics would have no significant effect on emissions. Attached is a table showing air flows at various modes for different sized engines (column 4). Since the greatest effect of this valve would be on small engines, the data for the 0-140 cubic inch engines will be considered. At 7 inches of mercury vacuum the air flow would be approximately 18 cubic feet per minute or .073 lbs per cubic ft x 18 equals 1.3 lbs. of air. Assuming an air fuel ratio of 14.5, this will give .09 lbs. of fuel. With this device we would have 19 cubic feet of air or 1.387 lbs. of air. Divided by .09 lbs. of fuel

gives 15.4 air fuel ratio. Since the air flow decreases very rapidly at vacuums below 7 in. of Hg. vacuum, the effect of the air-fuel ratio change on a CVS-75 test would be negligible. In addition, in many vehicles the power jet is activated at these vacuums and this would tend to eliminate any effect of the additional air. This is also true for the Chrysler lean burn engines and the staff is of the opinion that the effect would also be negligible.

The 1979 vehicle emission control systems are basically the same as the 1978 systems including some vehicles which are equipped with mechanisms that make the engine extremely sensitive to air-fuel mixture variations. These new systems include Volvo's three-way catalyst, the Bosch Jetronic Fuel Injection System, and the Variable Venturi Carburetor System. In the absence of any contrary data, it is the staff's judgment that the installation of the "Ball-Matic" device on the vehicles equipped with the above exhaust emission control systems could adversely affect the engine performance and operation.

IV. Manufacturer's Claims

The staff believes the installation of the device will not provide the fuel economy claims. On a typical small size engine the amount of air bleed allowed by the device is negligible at operating conditions above 7 in. Hg vacuum. At less than 7 in. of Hg. vacuum the power jet is usually in operation which enriches the air fuel mix. The small amount of additional air would not significantly effect the air-fuel ratio. In addition previous emission tests by the ARB

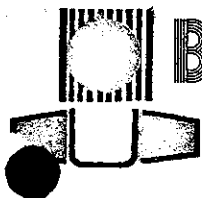
Laboratory did not show significant improvement in the fuel economy of the vehicles tested when the "Ball-Matic" device was installed. (Reference ARB Report titled "Evaluation of the Ball-Matic Corporation "Ball Matic Air Injector" device for Compliance with the Requirements of Section 27156 of the California Vehicle Code dated November 5, 1978).

V. Conclusions and Recommendations

The staff is of the opinion that the installation of this device would not affect the performance of the conventional emission control system and therefore recommends that the "Ball-Matic" Corporation be granted an exemption from the prohibitions of MVC Section 27156 for 1979 and older vehicles except for those vehicles equipped with:

1. Three-way catalyst with feed back system.
2. Bosch Jetronic Fuel Injection Systems.
3. Variable Venturi Carburetor Systems.

The staff therefore recommends adoption of Executive Order D-9-6.

**BALL-MATIC**

CORPORATION

STANDARDS

ORANGE, CALIFORNIA 92668

99###

A.C. 714- 633 -8723

ORANGE, CALIF.

AUG. 21, 1978

AIR RESOURCES BOARD
9528 TELESTAR AVE.
EL MONTE, CALIF. 91731
MR: G. HASS

DEAR SIR:

PLEASE REVIEW OUR POSSIBILITIES FOR AN EXTENSION OF YOUR EXECUTIVE ORDER D-9-5 (1978 AND OLDER VEHICLES), OUR AIR BLEED VALVE (BALL-MATIC), IS STILL THE SAME IN EVERY RESPECT WITH NO CHANGES SINCE LAST YEAR. I AM ENCLOSING A COPY OF A TEST RUN BY CHRYSLER CORP. WHICH WAS INSTALLED ON A NEW CHRYSLER LEAN BURN, WHICH LAST YEAR YOU REQUESTED THAT WE NOT INSTALL ON THESE CARS. THE TEST APPEARED TO DO NO HARM AS FAR AS EMISSIONS GO.

YOURS VERY TRULY

LONNIE W. SMITH PRES.

P.S. BOB VAN DERVEER (MANAGER) RAN THIS TEST FOR ME.

*
CHRYSLER CORPORATION
US DRIVING CYCLE
EMISSION TEST RESULTS
VERNON CA. EMISSION TEST LABORATORY
SPECIAL TEST -- SINGLE FAG PROCEDURE

TEST DATE 7.19.78. V.I.N. 7550. TEST NO - 433.

MODEL CH45. CID 318. TRANS AUT ODOM 4778.

DRY BULB TEMP 84. WET BULB TEMP 72. K FACTOR 1.120

BAPOMETER IN OF HG ABS. 29.84 TIME OF TEST 1030. HPS

DFL1A P IN HG 3.03 REL HUMIDITY 55.9 %

FLOW AS C.F.PFR FEV 0.2805 INLET TEMP 95.0

EMISSION	GRAMS PER MILE	
HC FID	0.04	7.5000
CO NDIF	0.29	0.0024
CO2 NDIF	457.12	2.4160
CHEMILU NOX	7.66	126.0000
TOTAL REVOLUTIONS	15929.	
TIME IN SECONDS	765.8000	
DISTANCE IN MILES	10.4300	

EPA FUEL ECONOMY 19.39

COMPUTED BY RIV, ON 07/19/78 AT 13:26CEI

*

Baseline

 CHEVROLET CORPORATION
 US DRIVING CYCLE
 EMISSION TEST RESULTS
 VERNON CA. EMISSION TEST LABORATORY
 SPECIAL TEST -- SINGLE BAG PROCEDURE

TEST DATE 7.19.78. V.I.N. 7550. TEST NO - 433.

MODEL CH45. CID 318. TRANS AUT ODOM 4778.
 DRY BULB TEMP 84. WET BULB TEMP 72. K FACTOR 1.120

BAROMETER IN OF HG ABS. 29.84 TIME OF TEST 1030. HRS

DELTA P IN HG 3.03 REL HUMIDITY 55.9 %

FLOW AS C.F.PER REV 0.2805 INLET TEMP 95.0

EMISSION	GRAMS PER MILE	
HC FID	0.04	7.5000
CO NDIR	0.29	0.0024
CO2 NDIR	457.06	2.4160
CHEMLU NOX	2.61	118.0000
TOTAL REVOLUTIONS	15927.	
TIME IN SECONDS	765.9000	
DISTANCE IN MILES	10.4300	

EPA FUEL ECONOMY 19.39

COMPUTED BY RTV. ON 07/19/78 AT 13:39CET

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W V81VC

BALL-MATIC
AIR INJECTOR VALVE

DATE 10-23-78
PROJECT 2V7810

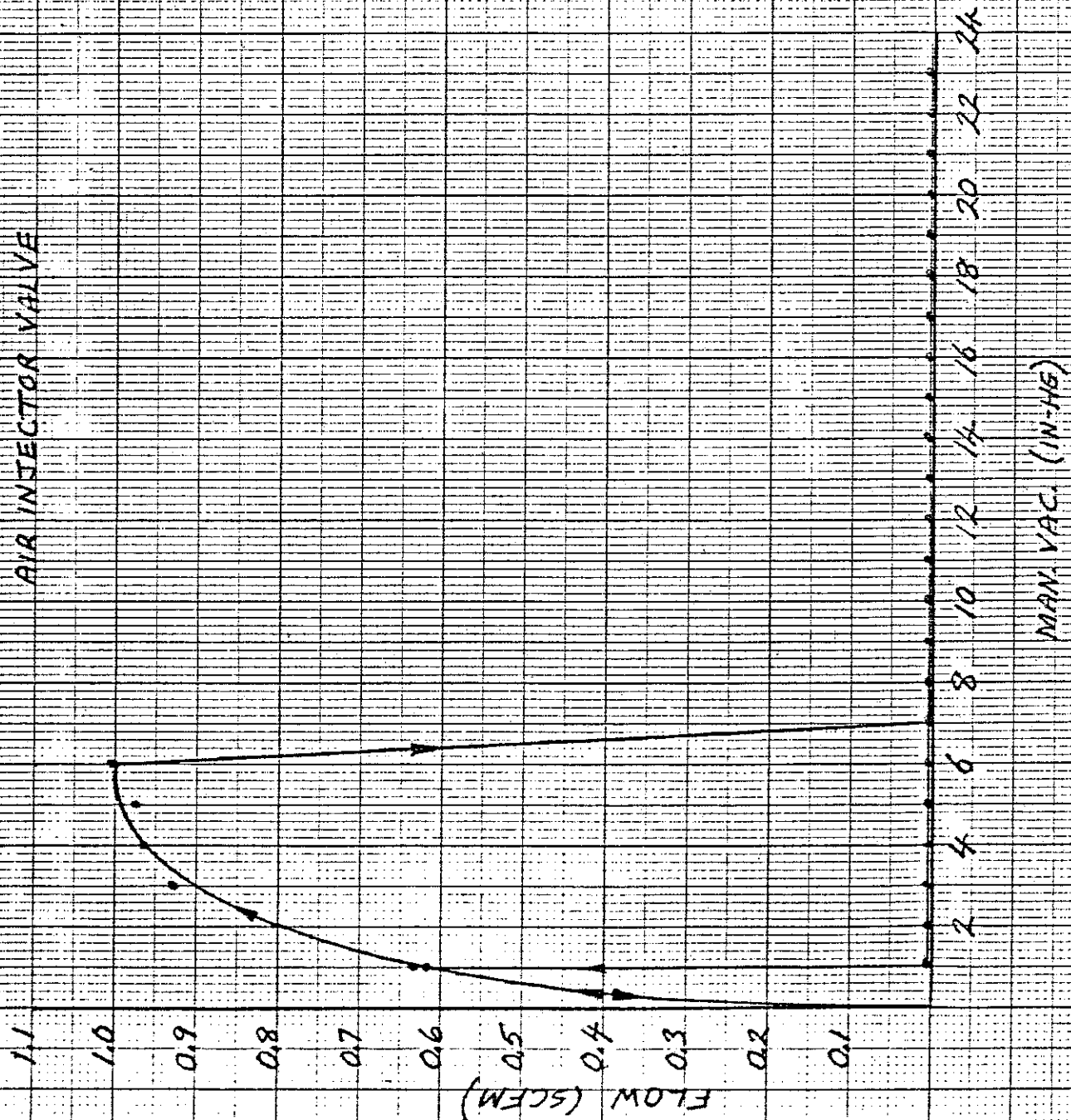


TABLE I

Formula Blowby, ACFM @ 1100°F, 30" Hg.
(in population deciles)

Class Allowable ACFM at 1100°F	Blowby cu. in.	Oper. Cond.	Formula Air ACFM @ 1100°F 30" Hg	Formula Blowby, ACFM @ 1100°F, 30" Hg. (in population deciles)										Upstream Deviation Error, %
				1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	Ave.
a 0.015	0-140	Idle 16" 10" 2"	3	0.07	0.10	0.13	0.15	0.18	0.22	0.25	0.31	0.39	0.58	0.24
			10	0.11	0.17	0.21	0.25	0.30	0.35	0.41	0.50	0.63	0.95	0.39
			15	0.18	0.27	0.33	0.40	0.48	0.56	0.65	0.80	1.00	1.54	0.62
			23	0.27	0.41	0.50	0.61	0.72	0.85	1.00	1.21	1.51	2.31	0.94
b 0.031	140-200	Idle 16" 10" 2"	6	0.10	0.17	0.20	0.25	0.29	0.34	0.40	0.48	0.61	0.96	0.38
			23	0.26	0.42	0.52	0.64	0.75	0.86	1.02	1.21	1.55	2.05	0.97
			37	0.43	0.68	0.84	1.03	1.20	1.40	1.65	1.95	2.50	3.95	1.56
			55	0.64	1.01	1.25	1.54	1.80	2.10	2.48	2.92	3.75	5.92	2.34
c 0.043	200-250	Idle 16" 10" 2"	8	0.23	0.33	0.39	0.45	0.51	0.57	0.64	0.74	0.88	1.23	0.60
			30	0.48	0.72	0.86	0.98	1.11	1.25	1.40	1.61	1.91	2.66	1.30
			47	0.80	1.12	1.32	1.51	1.71	1.93	2.17	2.49	2.95	4.12	2.01
			71	1.17	1.64	1.95	2.22	2.52	2.84	3.19	3.66	4.34	6.06	2.96
d 0.052	250-300	Idle 16" 10" 2"	10	0.38	0.50	0.58	0.66	0.73	0.80	0.89	1.01	1.16	1.55	0.83
			36	0.89	1.19	1.37	1.54	1.72	1.89	2.09	2.36	2.70	3.64	1.94
			57	1.38	1.83	2.14	2.30	2.66	2.91	3.23	3.64	4.18	5.63	3.00
			86	2.04	2.70	3.13	3.50	3.91	4.29	4.75	5.36	6.15	8.27	4.41
e 0.064	300-375	Idle 16" 10" 2"	12	0.27	0.38	0.45	0.51	0.58	0.65	0.74	0.84	1.01	1.41	0.68
			45	0.70	0.99	1.17	1.33	1.51	1.71	1.92	2.20	2.62	3.66	1.78
			70	1.09	1.53	1.81	2.06	2.34	2.64	2.96	3.41	4.05	5.66	2.76
			104	1.60	2.24	2.66	3.04	3.44	3.88	4.36	5.01	5.95	8.33	4.05
f 0.077	Over 375	Idle 16" 10" 2"	14	0.23	0.27	0.33	0.37	0.42	0.47	0.51	0.62	0.73	1.03	0.50
			53	0.62	0.85	1.02	1.17	1.32	1.48	1.68	1.93	2.28	3.19	1.56
			82	0.96	1.33	1.58	1.80	2.04	2.30	2.60	2.99	3.52	4.94	2.41
			122	1.41	1.96	2.33	2.66	3.01	3.38	3.82	4.40	5.18	7.26	3.54

*Maximum allowable weighted ACFM Blowby outflow, based on 0.10% (Standard 10-23-64) of supplied fuel outflow, as 10,000 PPH hexane as measured by non-dispersive infrared analyzer.

11/14/62
Revised
4-14-65

Six 'Gasoline-Saving' Gadgets

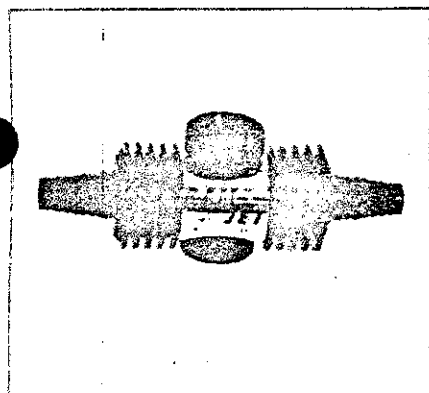
Most people stop believing in genies and tooth fairies long before they're old enough to drive a car. Yet some motorists continue to buy various "miracle" devices that are supposed to "jet assist" a car's engine, "convert air into energy," or "bombard" gasoline with "pre-ionized radiant energy" to save gasoline.

None of the many such devices we've tested in past years has even come close to living up to the claims. Nevertheless, we tried again, with the six gadgets described in this report. The gadgets, whose prices range from \$2.95 to \$30, are of four basic types: air-bleed valves, which add extra air to the air-fuel mixture; an ignition spark intensifier; a fuel-pressure regulator; and a capacitive-discharge (CD) ignition system.

The ads for the six gadgets promise a plethora of benefits, including easier engine starting, smoother running, "blazing" pick-up, longer engine life, and reduced emissions. But since the main thrust of the ads is more miles per gallon or per tankful, we restricted our tests to fuel-economy runs. We

simulated city driving, with its frequent stops and starts, by driving a one-mile course at an average of 18 mph. Our 55-mph constant-speed test simulated a long trip on an interstate highway. We ran yet another test on a 33-mile segment of our 195-mile test trip, at speeds up to 55 mph and at an average of 45 mph; the route included hills, curves, and several traffic lights and stop signs. We performed enough tests so that a statistically significant improvement—as little as ½ mpg—would have shown up.

Since the claims made for the six gadgets would be particularly tempting to the owner of a gasoline-guzzling car, we bought as our test vehicle a used 1972 Pontiac LeMans station wagon with a 350-cubic-inch V8 and an automatic transmission. We checked the car thoroughly, gave it a major tune-up, and equipped it with our highly accurate fuel-mileage test equipment. We kept variables to a minimum by running each test without the gadget and then—on the same day and with the same driver—with the gadget installed. We



Ram-Jet Supercharger

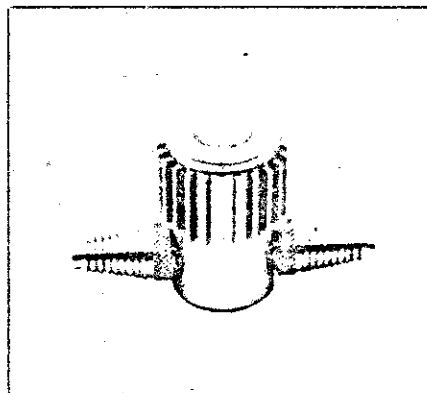
Price: \$13-15.

Distributors: Almquist Mfg., NYC. Consumers Co-Operative Service, Chicago. Endura Products, Cleveland. KM Enterprises, Chicago. RJ Supercharger, NYC.

What is it? An air-bleed valve that is installed in the rubber hose between the positive-crankcase-ventilation (PCV) valve and the engine intake system. It is supposed to allow additional air to enter below the carburetor during conditions such as acceleration and hill-climbing. The ads claim that, under such conditions, the carburetor normally mixes too little air with the gasoline, thus wasting gasoline.

Gasoline-mileage claim: Up to 50 extra miles per tankful.

CU's test results: No significant change in gasoline mileage.



Ball-Matic Air Injector

Other names: Turbo-Dyne Energy Chamber. G-R Gas Saver Valve.

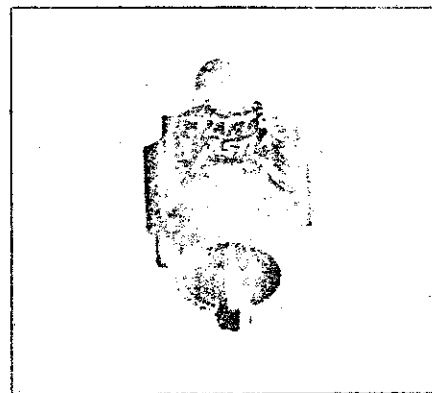
Price: \$13-16.

Distributors: Pratt-American Div., American Consumer Inc., Philadelphia. C. I. Energy Development Inc., Tarzana, Calif.

What is it? An air-bleed valve that connects to the intake manifold or to the PCV port on the carburetor. It claims to work on a principle similar to that of the *Ram-Jet Supercharger*, preceding. The sales pitch includes an endorsement by former astronaut Gordon Cooper.

Gasoline-mileage claim: Up to almost twice the mileage.

CU's test results: No significant change in gasoline mileage.



Spark Master Intensifier

Price: \$2.95.

Distributors: J. C. Whitney & Co., Chicago. Triamics Corp., Riverdale, N.J.

What is it? A plastic-covered device that plugs into the center of the ignition distributor cap. An air gap in the circuit inside the device is supposed to give a hotter spark.

Gasoline-mileage claim: Up to 15 percent more gasoline mileage.

CU's test results: No significant change in gasoline mileage.

drove 4500 miles and used 360 gallons of gasoline during project.

Note that some of the gadgets are marketed under several different names and by several distributors. From the descriptions and the photographs, you should be able to identify essentially similar gadgets, even if they are marketed under still other names.

RECOMMENDATIONS

When you're thinking of buying any product—and especially a gadget that promises to turn a gasoline guzzler into an economy car—we suggest that you take guidance from the following rule of thumb: If the claim seems too good to believe, don't believe it.

None of the six tested devices affected the gasoline mileage of our Pontiac test car measurably under any driving conditions. We didn't bother to test the other claims made for the gadgets, and we don't think that anyone should take those claims seriously.

The only possible exception is the capacitive-discharge ignition. It might make spark plugs and distributor points last longer—but it would be a long time before the saving thus made would equal the cost of the device and its installation.

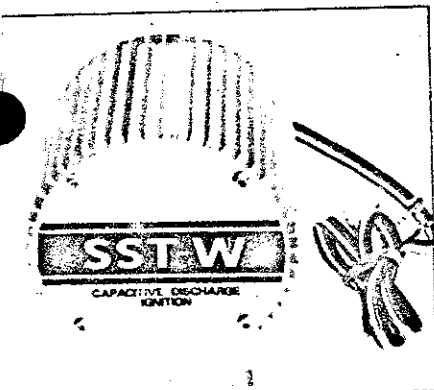
Actually, you can increase your car's gasoline mileage dramatically without adding any gadgets. The best way to

save fuel is by driving properly. Some years ago we ran gasoline-mileage tests with a 1974 Dodge Coronet V8. We drove the car aggressively on an 18-mile commuting trip that included stops and starts. Then we repeated the trip but drove carefully. In virtually the same driving time, we averaged 8.9 mpg on the first trip and 16.6 mpg—almost twice the mileage—on the second trip.

Here are some economy tips:

After starting a cold engine, be ready to drive off at moderate speed as soon as the engine is running smoothly. Obviously, a car gets zero mpg at idle. Further, when the engine is cold and the choke is on, fuel consumption is very high. Driving off immediately, rather than idling, warms up the engine more quickly. Avoid fast starts and hard braking. Try to anticipate traffic conditions so you can keep braking and acceleration to a minimum. Maintain steady, moderate speeds on the highway; high speeds cost gasoline. Keep your right foot as steady as possible on the accelerator pedal.

The condition of your car is important. Keep the engine in good tune; a misfiring spark plug or a clogged air filter can waste lots of fuel. Keep your tires properly inflated. Use the air-conditioner as little as possible. Don't use the trunk as a storage compartment; extra weight wastes fuel. A roof rack causes considerable wind resistance. If you have a removable rack, leave it off when you're not using it.



Capacitive Discharge Ignition System

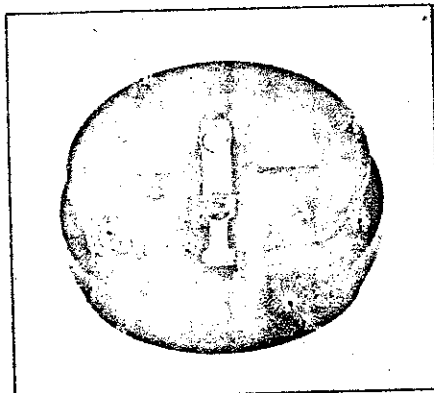
Price: \$30.

Distributor: J.C. Whitney & Co., Chicago.

What is it? An electronic ignition device, connected between the distributor and the coil, that stores and generates electrical energy to fire the spark plugs. A capacitive-discharge system provides the same amount of electrical energy at all engine speeds; a conventional ignition system delivers less energy at high engine speeds.

Gasoline-mileage claim: 10 percent more gasoline mileage "is typical."

CU's test results: No significant change in gasoline mileage (but see the Recommendations, above).



Electronic Supercharger

Other name: Sol-R-Volt Electronic Radiation Injector & Engine Powerizer.

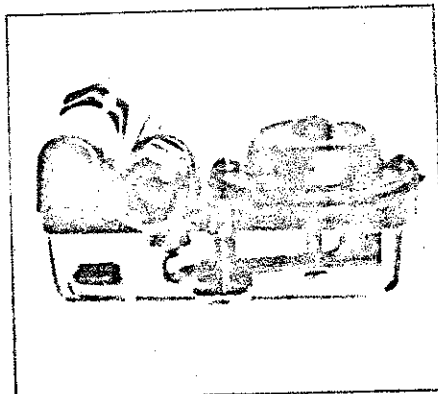
Price: \$10.

Distributors: J. C. Whitney & Co., Chicago. Solar-Volt Co., Fullerton, Calif.

What is it? A device that replaces the rotor in the ignition distributor. Despite a printed circuit board and other dress-up features, it performs the same basic function as the rotor.

Gasoline-mileage claim: 15 to 35 percent more gasoline mileage.

CU's test results: No significant change in gasoline mileage.



Super Energy Cell

Price: \$7 for domestic cars, \$8 for foreign cars.

Distributors: J.C. Whitney & Co., Chicago. Milemaster, Exeland, Wis.

What is it? A fuel-pressure regulator installed between the fuel pump and carburetor. The device is supposed to limit the fuel pressure and prevent too much gasoline from being pumped into the carburetor at high speed. Installation requires cutting the fuel line.

Gasoline-mileage claim: Up to 20 to 25 percent less gasoline consumption.

CU's test results: No significant change in gasoline mileage.